Reference Manual

PlantPAx
Process Automation System

Rockwell Automation Library of Process Objects: Solenoid-operated Valve (P_ValveSO)

Version 3.1

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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Notes:

This manual contains new and updated information. Changes throughout this revision are marked by change bars, as shown to the right of this paragraph.

Software Compatibility and Content Revision

Table 1 - Summary of Changes

Topic	Page
P_ValveMO Input Parameters, PCmd_Open and PCmd_Close: Under 'When PCmd_Clear is 1', second bullet, changed text to read 'Set PCmd_Close to 1 to close valve' Under 'When PCmd_Clear is 0', second bullet, changed text to read 'Set PCmd_Open to 0 to close valve' Added new bullet '**NOTE:** PCmd_Close is not used to control the valve'	14

For the latest compatible software information and to download the Rockwell Automation® Library of Process Objects, see the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

For general library considerations, see Rockwell Automation Library of Process Objects, publication PROCES-RM002.

Additional Resources

These documents contain more information about related products from Rockwell Automation.

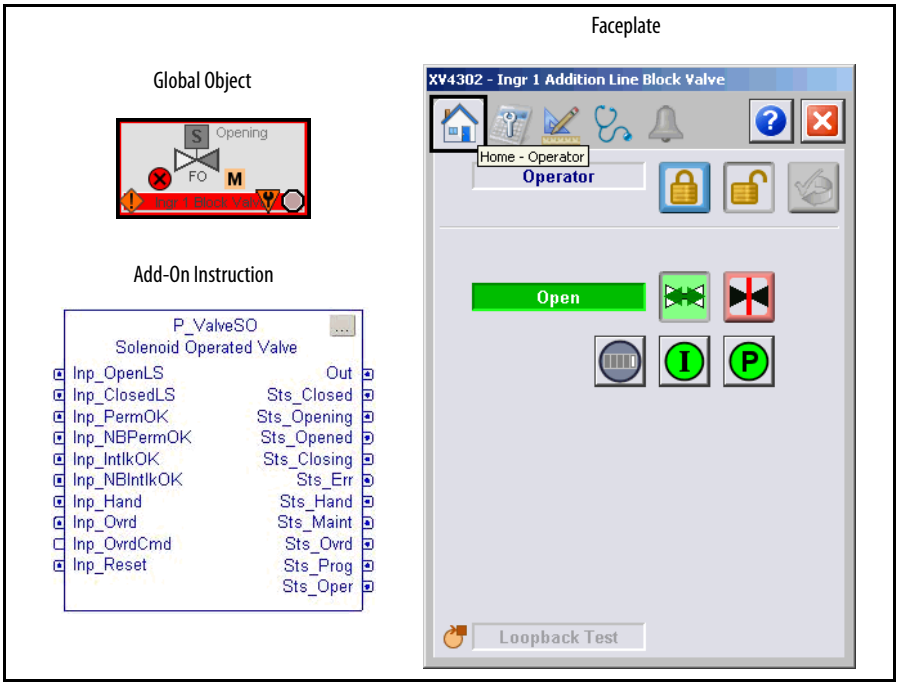
Resource	Description
PlantPAx Process Automation System Selection Guide, publication PROCES-SG001	Provides information to assist with equipment procurement for your PlantPAx® system.
PlantPAx Process Automation System Reference Manual, publication PROCES-RM001	Provides characterized recommendations for implementing your PlantPAx system.
Rockwell Automation Library of Process Objects, publication PROCES-RM002	Provides general considerations for the PlantPAx system library of process objects.
FactoryTalk® View Machine Edition User Manual, publication VIEWME-UM004	Provides details on how to use this software package for creating an automation application.
FactoryTalk View Site Edition User Manual, publication VIEWSE-UM006	Provides details on how to use this software package for developing and running human-machine interface (HMI) applications that can involve multiple users and servers, distributed over a network.
Logix5000™ Controllers Add-On Instructions Programming Manual, publication 1756-PM010	Provides information for designing, configuring, and programming Add-On Instructions.
Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002	Details how to monitor an input condition to raise an alarm. Information includes acknowledging, resetting, inhibiting, and disabling an alarm. Generally the P_Alarm faceplate is accessible from the Alarms tab.
Rockwell Automation Library of Process Objects: Interlocks with First Out and Bypass (P_Intlk) Reference Manual, publication SYSLIB-RM004	Explains how to collect (sum up) the interlock conditions that stop or de-energize a running or energized piece of equipment or prevent it from starting or being energized.

Resource	Description
Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005	Explains how to choose the Mode (owner) of an instruction or control strategy. The Mode instruction is usually embedded within other instructions to extend their functionality. It is possible to use a standalone Mode instruction to enhance a program where modes are wanted.
Rockwell Automation Library of Process Objects: Permissives with Bypass (P_Perm) Reference Manual, publication SYSLIB-RM007	Details how to collect permissive conditions to start a piece of equipment.
Rockwell Automation Library of Process Objects: 2-state Valve Statistics (P_ValveStats) Reference Manual, publication SYSLIB-RM036	Explains how to monitor stroke times and stroke counts for a 2-state (open and close) valve.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Solenoid-operated Valve (P_ValveSO)

The P_ValveSO (Solenoid-operated Valve) Add-On Instruction is used to operate (open and close) a single solenoid-operated valve in various modes, monitoring for fault conditions.



Guidelines

Use this instruction when you need to operate a single-solenoid spring-return valve, either energize-to-open (fail closed) or energize-to-close (fail open). The valve can have, but does not require, limit switch feedback for either or both ends of travel.

Do **not** use this instruction in these situations:

- You need to operate a motor-operated valve or other valve that requires separate Open and Close outputs. Use the P_ValveMO Motor-operated Valve Add-On Instruction instead. The P_ValveMO Instruction can also be suitable for some dual-solenoid valves.
- You need to operate a multi-solenoid valve such as a Mix-proof Valve that has positions (such as for SIP/CIP) other than 'opened' and 'closed'. Use the P_ValveMP Mix-proof Valve Add-On Instruction instead.
- You need to monitor a valve that is primarily operated by hand. The valve could support a 'trip' output to drive it to a 'safe' position. Use the P_ValveHO Hand-operated Valve Add-On Instruction instead.
- You have a throttling (continuously variable) valve. Use the P_AOut Analog Output Instruction, the P_ValveC Control Valve Instruction, or operate the valve directly from a PIDE or PID built-in Instruction.
- For some valves, the P_DOut Discrete Output, P_D4SD Discrete Four-State Device, or the P_nPos n-Position Device instruction can be of possible use.

Functional Description

The P_ValveSO instruction includes an Add-On Instruction for use with RSLogix™ 5000 software, version 18 or later, and Logix controllers, version 18 or later. P_ValveSO also includes a multi-tabbed faceplate and several graphic symbols for use in building displays on FactoryTalk View SE version 7.0 or later.

The P_ValveSO provides the following capabilities:

- Provide for ownership of the Solenoid Valve through the standard P_Mode Add-On Instruction and Modes. See Modes on page 20.
- Provide for configuration of the de-energized state of the valve: Fail Open or Fail Closed (default) at the engineer level.
- Provide the ability to open or close a Solenoid Valve. If the valve is so equipped, monitor open/close limit switch feedback to verify that the Solenoid Valve is opened or closed. Whether the Solenoid Valve has each of the feedback limit switches can be configured at the engineer level. Whether to use each of the feedback limit switches can be configured at the Maintenance level.
- Provide an alarm for Full Stall if the valve feedback indicates it did not move off the original position within a configured amount of time when commanded to the other position. Provide an alarm for Transit Stall if the valve feedback indicates the valve moved from the original position but did not reach the target position within a configured amount of time. The Transit Stall or Full Stall condition can optionally de-energize the output to the valve, requiring a reset.
- Provide a limit switch Failure indication if the limit switches indicate the valve is not closed, not opened, and not moving. Provide a configuration for the failure state: whether both switches are ON or both switches are OFF to indicate limit switch failure.
- Provide for Permissives (those that can be bypassed and those that cannot be bypassed) which are conditions that allow the Solenoid Valve to energize. Also provide for Interlocks (those that can be bypassed and those that cannot be bypassed) which are conditions that de-energize the Solenoid Valve and prevent energizing. Provide an Alarm when an Interlock de-energizes the Solenoid Valve. Provide Maintenance the capability to bypass the Permissives and Interlocks that can be bypassed.
- Provide maintenance personnel the capability to Disable (keep de-energized) the Solenoid Valve.
- Monitor an I/O Fault input and alarm on an I/O Fault. The I/O Fault condition can optionally de-energize the output to the valve, requiring a reset.
- In Override mode, provide an Override State input that determines whether the Override is to Open or Close the Solenoid Valve (default = Close). See Modes on page 20 for more information on Override.

- Provide a Simulation capability, where the output to the Solenoid Valve is kept de-energized, but the instruction can be manipulated as if a working Solenoid Valve were present. The delay between a command to Open or Close and the simulated opened or closed response is configurable. (This same delay is used if the Solenoid Valve is configured with no Open/Close feedback.) This capability is often used for activities such as instruction testing and operator training.
- Provide an output suitable for holding the Solenoid Valve coil energized (to open or close, based on the configured fail state).

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This code lets you create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix® firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

Controller File

The P_ValveSO_3_1-**00**_AOI.L5X Add-On Instruction must be imported into the controller project to be used in the controller configuration. The service release number (boldfaced) can change as service revisions are created.

Visualization Files

The following files for this Add-On Instruction can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT Files must be imported in the following order: image files, then global object files, and then graphic files. This order is required to configure the visualization files properly.

Table 2 - P_ValveSO Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics - Displays	GFX	(RA-BAS) P_ValveSO-Faceplate	(RA-BAS-ME) P_ValveSO-Faceplate	The faceplate display that is used for the object.
		(RA-BAS) P_ValveSO-Help	(RA-BAS-ME) P_ValveSO-Help	The help display that is used for the object.
		(RA-BAS) P_ValveSO-Quick	(RA-BAS-ME) P_ValveSO-Quick	The Quick display for the object.
		(RA-BAS) Common-AnalogEdit	N/A	Faceplate that is used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
		(RA-BAS) P_Alarm-Faceplate	(RA-BAS-ME) P_Alarm-Faceplate	The alarm faceplate display that is used for the object.
		(RA-BAS) P_Alarm-Help	(RA-BAS-ME) P_Alarm-Help	P_Alarm Help information that is accessed from the P_Alarm Help faceplate.
		(RA-BAS) P_Mode-Config	(RA-BAS-ME) P_Mode-Config	Display used to set Default mode.
		(RA-BAS) P_Mode-Help	(RA-BAS-ME) P_Mode-Help	Mode Help information that is accessed from the P_Mode Help faceplate.
Optional Graphic Displays		(RA-BAS) P_Intlk-Faceplate	(RA-BAS-ME) P_Intlk-Faceplate	The Interlock faceplate display that is used for the object. Use this file if your Solenoid-operated Valve has an associated P_Intlk object and you enable navigation to its faceplate from the Solenoid-operated Valve faceplate.
		(RA-BAS) P_IntlkPerm-Help	(RA-BAS-ME) P_IntlkPerm-Help	Interlock/Permissives Help information that is accessed from the P_Intlk or P_Perm Help faceplate. Use this file if you use the P_Intlk or P_Perm objects.
		(RA-BAS) P_Perm-Faceplate	(RA-BAS-ME) P_Perm-Faceplate	The Permissives faceplate display that is used for the object. Use this file if your Solenoid-operated Valve has an associated P_Perm object and you enable navigation to its faceplate from the Solenoid-operated Valve faceplate.
		(RA-BAS) P_ValveStats-Faceplate	(RA-BAS-ME) P_ValveStats-Faceplate	The Valve Stats faceplate display that is used for the object. Use this file if your Solenoid-operated Valve has an associated P_ValveStats object and you enable navigation to its faceplate from the Solenoid-operated Valve faceplate.

Table 2 - P_ValveSO Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics - Global Objects	GGFX	(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Common global objects that are used on all Process Object faceplates.
		(RA-BAS) Process Alarm Objects	(RA-BAS-ME) Process Alarm Objects	Global objects that are used for alarming on Process Object faceplates.
		(RA-BAS) Process Faceplate Valve Objects	(RA-BAS-ME) Process Faceplate Valve Objects	Global objects that are used for Process Object valve faceplates.
		(RA-BAS) Process Graphics Library	(RA-BAS-ME) Process Graphics Library	Graphic objects that are used to build process displays for process objects, including P_ValveSO.
		(RA-BAS) Process Help Objects	(RA-BAS-ME) Process Help Objects	Global objects that are used for help on all Process Objects help displays.
		(RA-BAS) Process Interlock Objects	(RA-BAS-ME) Process Intlk Objects	Global objects that are used for managing interlocks and permissives on Process Object faceplates.
		(RA-BAS) Process Mode Objects	(RA-BAS-ME) Process Mode Objects	Global objects that are used for managing modes on process object faceplates.
Graphics - Images	PNG	All .png files in the images folder	All .png files in the images folder	The common icons used in the global objects and faceplates for all Process Objects. When PNG graphic formats are imported, they are renamed like a BMP file but retain a PNG format.
HMI Tags	CSV	N/A	FTVME_PlantPAxLib_Tags_3_1_**00**.csv(1)	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

(1) The service release number (boldfaced) can change as service revisions are created.

Controller Code

This section describes the parameter references for this Add-On Instruction.

Solenoid-operated Valve Input Structure

Input parameters include the following:

- Input data elements (Inp_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.
- Command data elements (PCmd_, OCmd_, MCmd_) are used by program logic, operators, and maintenance personnel to request instruction actions.

Table 3 - P_ValveSO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
EnableIn	BOOL		1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Inp_OpenLS	BOOL		0	Valve Open and Closed Limit switch: 1 = Confirmed open or closed
Inp_ClosedLS				
Inp_PermOK	BOOL		1	1 = Permissives (those that can be bypassed and those that cannot be bypassed) OK, valve can energize.
Inp_NBPermOK	BOOL		1	1 = Permissives (those that cannot be bypassed) OK, valve can energize if permissives that can be bypassed are bypassed.
Inp_IntlkOK	BOOL		1	1 = Interlocks (those that can be bypassed and those that cannot be bypassed) OK, valve can energize.
Inp_NBIntlkOK	BOOL		1	1 = Interlocks (those that cannot be bypassed) OK, valve can energize if interlocks that can be bypassed are bypassed.
Inp_IOFault	BOOL		0	Input communication status: 0 = OK 1 = Fail
Inp_Sim	BOOL		0	Simulation input. When set to 1, the instruction keeps the output de-energized and simulates a working solenoid valve. When set to 0, the instruction operates the valve normally.
Inp_Hand	BOOL	Mode.Inp_Hand	0	1 = Select Hand (hardwired) mode. 0 = Release Hand mode.
Inp_Ovrd	BOOL	Mode.Inp_Ovrd	0	1 = Select Override (higher priority Program logic) mode. 0 = Override mode.
Inp_OvrdCmd	DINT		0	Override mode command: 0 = None 1 = Close 2 = Open
Inp_Reset	BOOL		0	Input parameter used to programmatically reset alarms. When set to 1, all alarms requiring reset are reset.
Cfg_FailOpen	BOOL		0	1 = Fail Open (energize to close). 0 = Fail Closed (energize to open).
Cfg_HasOpenLS	BOOL		0	1 = Valve provides an Open or Closed Limit switch signal.
Cfg_HasClosedLS				
Cfg_UseOpenLS				1 = Valve Open or Closed Limit switch is used for failure checking.
Cfg_UseClosedLS				
Cfg_LSFail	BOOL		1	1 = Both switches ON = fail. 0 = Both switches OFF = fail.
Cfg_HasPermObj	BOOL		0	1 = Tells the HMI a library object is connected to Inp_Perm. **IMPORTANT:** The name of the Permissive object in the controller must be this object's name with the suffix '_Perm'. For example, if your P_ValveSO object has the name 'ValveSO123', then its Permissive object must be named 'ValveSO123_Perm'.

Table 3 - P_ValveSO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_HasIntlkObj	BOOL		0	1 = Tells the HMI a library object is connected to Inp_Intlk **IMPORTANT:** The name of the Interlock object in the controller must be this object's name with the suffix '_Intlk'. For example, if your P_ValveSO object has the name'ValveSO123', then its Interlock object must be named 'ValveSO123_Intlk'.
Cfg_HasStatsObj	BOOL		0	1 = Tells the HMI a P_ValveStats object has been created for this instance of P_ValveSO. **IMPORTANT:** The name of the Valve Stats object in the controller must be this object's name with the suffix '_ValveStats'. For example, if your P_ValveSO object has the name'ValveSO123', then its Valve Stats object must be named 'ValveSO123_ValveStats'.
Cfg_PCmdClear	BOOL	Mode.Cfg_PCmdClear	1	When this parameter is 1, program commands are cleared once they are acted upon. When set to 0, program commands remain set until cleared by the application program logic. **IMPORTANT:** Clearing this parameter online can cause unintended program command execution.
Cfg_ProgDefault	BOOL	Mode.Cfg_ProgDefault	0	This parameter defines the default mode. When this parameter is 1, the mode defaults to Program if no mode is being requested. When this parameter is 0, the mode defaults to Operator if no mode is being requested. **IMPORTANT:** Changing this parameter online can cause unintended mode changes.
Cfg_OCmdResets	BOOL		0	1 = New Operator Valve Command resets fault. 0 = Reset required to clear fault.
Cfg_ShedOnFullStall	BOOL		1	1 = De-energize Valve and Alarm on Full Stall, Transit Stall, or I/O Fault. 0 = Alarm only on Full Stall, Transit Stall, or I/O Fault.
Cfg_ShedOnTransitStall				
Cfg_ShedOnIOFault				
Cfg_OvrdPermIntlk	BOOL		0	1 = Override ignores permissive/interlock that can be bypassed. 0 = Always use permissive/interlock.
Cfg_HasFullStallAlm	BOOL	FullStall.Cfg_Exists	0	These parameters determine whether the corresponding alarm exists and is checked or if the alarm does not exist and is not used. When these parameters are 1, the corresponding alarm exists.
Cfg_HasTransitStallAlm		TransitStall.Cfg_Exists		
Cfg_HasIntlkTripAlm		IntlkTrip.Cfg_Exists		
Cfg_HasIOFaultAlm		IOFault.Cfg_Exists		
Cfg_FullStallResetReqd	BOOL	FullStall.Cfg_ResetReqd	0	These parameters determine whether a reset is required to clear the alarm status. When these parameters are 1, the alarm is latched ON when the alarm occurs. After the alarm condition returns to normal, a reset is required to clear the alarm status. For example, OCmd_Reset, Inp_Reset, or IOFault.OCmd_Reset are required to clear Alm_IOFault alarm after the alarm is set and the value returns to normal. When these parameters are 0, no reset is required and the alarm status is cleared when the alarm condition returns to normal. **IMPORTANT:** If the reset clears the alarm, it also acknowledges the alarm.
Cfg_TransitStallResetReqd		TransitStall.Cfg_ResetReqd		
Cfg_IntlkTripResetReqd		IntlkTrip.Cfg_ResetReqd		
Cfg_IOFaultResetReqd		IOFault.Cfg_ResetReqd		
Cfg_FullStallAckReqd	BOOL	FullStall.Cfg_AckReqd	1	These parameters determine whether an acknowledgement is required for an alarm. When these parameters are 1, the acknowledge (ack) bit is cleared when the alarm occurs. An acknowledge command (for example, PCmd_IOFaultAck or IOFault.OCmd_Ack) is required to acknowledge the alarm. When set to 0, the Acknowledge bit is set when an alarm occurs, indicating an acknowledged alarm and no acknowledge command is required.
Cfg_TransitStallAckReqd		TransitStall.Cfg_AckReqd		
Cfg_IntlkTripAckReqd		IntlkTrip.Cfg_AckReqd		
Cfg_IOFaultAckReqd		IOFault.Cfg_AckReqd		

Table 3 - P_ValveSO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
Cfg_FullStallSeverity	INT	FullStall.Cfg_Severity	1000	These parameters determine the severity of each alarm. The severity drives the color and symbol that are used to indicate alarm status on the faceplate and global object. The following are valid values: 1…250 = Low 251…500 = Medium 501…750 = High 751…1000 = Urgent **IMPORTANT:** For FactoryTalk View software version 7.0, these severity parameters drive the indication on the global object and faceplate. The Alarms and Events definition of severity drives the color and symbol that is used on the alarm banner and alarm summary. The definition also drives the value returned by FactoryTalk Alarms and Events display commands.
Cfg_TransitStallSeverity		TransitStall.Cfg_Severity	1000	
Cfg_IntlkTripSeverity		IntlkTrip.Cfg_Severity	500	
Cfg_IOFaultSeverity		IOFault.Cfg_Severity	1000	
Cfg_SimFdbkT	DINT		2	Delay (in seconds) to echo back open/closed status when in simulation or when position feedbacks are not being used.
Cfg_FullStallT	DINT		5	After command, time with no motion before fault (seconds).
Cfg_TransitStallT	DINT		10	After command, time to reach position before fault (seconds).
PSet_Owner	DINT		0	Program Owner Request ID (nonzero) or release (zero).
PCmd_Open	BOOL		0	When Cfg_PCmdClear is 1: • Set PCmd_Open to 1 to open the valve • Set PCmd_Close to 1 to close the valve • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Open to 1 to open the valve • Set PCmd_Open to 0 to close the valve • **NOTE:** PCmd_Close is not used to control the valve • These parameters do not reset automatically
PCmd_Close				
PCmd_Acq	BOOL	Mode.PCmd_Acq	0	When Cfg_PCmdClear is 1: • Set PCmd_Acq to 1 to Acquire • Set PCmd_Rel to 1 to Release • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Acq to 1 to Acquire • Set PCmd_Acq to 0 to Release • PCmd_Rel is not used • These parameters do not reset automatically
PCmd_Rel		Mode.PCmd_Rel		
PCmd_Lock	BOOL	Mode.PCmd_Lock	0	When Cfg_PCmdClear is 1: • Set PCmd_Lock to 1 to Lock • Set PCmd_Unlock to 1 to Unlock • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_Lock to 1 to Lock • Set PCmd_Lock to 0 to Unlock • PCmd_Unlock is not used • These parameters do not reset automatically
PCmd_Unlock		Mode.PCmd_Unlock		
PCmd_Reset	BOOL		0	• Set PCmd_Reset to 1 to reset all alarms requiring reset • This parameter is always reset automatically
PCmd_FullStallAck	BOOL	FullStall.PCmd_Ack	0	• Set PCmd_<Alarm>Ack to 1 to Acknowledge alarm • The parameter is reset automatically
PCmd_TransitStallAck		TransitStall.PCmd_Ack		
PCmd_IntlkTripAck		IntlkTrip.PCmd_Ack		
PCmd_IOFaultAck		IOFault.PCmd_Ack		

Table 3 - P_ValveSO Input Parameters

Input Parameter	Data Type	Alias For	Default	Description
PCmd_FullStallSuppress	BOOL	FullStall.PCmd_Suppress	0	When Cfg_PCmdClear is 1: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Unsuppress to 1 to unsuppress alarm • These parameters reset automatically When Cfg_PCmdClear is 0: • Set PCmd_<Alarm>Suppress to 1 to suppress alarm • Set PCmd_<Alarm>Suppress to 0 to unsuppress alarm • PCmd_<Alarm>Unsuppress is not used • These Parameters do not reset automatically
PCmd_TransitStallSuppress		TransitStall.PCmd_Suppress		
PCmd_IntlkTripSuppress		IntlkTrip.PCmd_Suppress		
PCmd_IOFaultSuppress		IOFault.PCmd_Suppress		
PCmd_FullStallUnsuppress	BOOL	FullStall.PCmd_Unsuppress	0	
PCmd_TransitStallUnsuppress		TransitStall.PCmd_Unsuppress		
PCmd_IntlkTripUnsuppress		IntlkTrip.PCmd_Unsuppress		
PCmd_IOFaultUnsuppress		IOFault.PCmd_Unsuppress		
PCmd_FullStallUnshelve	BOOL	FullStall.PCmd_Unshelve		• Set PCmd_<Alarm>Unshelve to 1 to Unshelve alarm • The parameter is reset automatically
PCmd_TransitStallUnshelve		TransitStall.PCmd_Unshelve		
PCmd_IntlkTripUnshelve		IntlkTrip.PCmd_Unshelve		
PCmd_IOFaultUnshelve		IOFault.PCmd_Unshelve		
OCmd_Open	BOOL		0	Operator command to open or close valve.
OCmd_Close				
OCmd_Bypass	BOOL		0	Operator command to bypass all interlocks and permissives that can be bypassed.
OCmd_Check	BOOL		0	Operator command to check (not bypass) all interlocks and permissives.
MCmd_Disable	BOOL		0	Maintenance command to disable (de-energize) valve.
MCmd_Enable	BOOL		0	Maintenance command to enable (allow to energize) valve.
MCmd_Acq	BOOL	Mode.MCmd_Acq	0	Maintenance command to acquire ownership (Operator/Program/Override to Maintenance).
MCmd_Rel	BOOL	Mode.MCmd_Rel	0	Maintenance command to release ownership (Maintenance to Operator/ Program/Override).
OCmd_AcqLock	BOOL	Mode.OCmd_AcqLock	0	Operator command to acquire or lock in Operator mode, unlock or release Operator mode, reset all alarms requiring reset, or reset all alarms and latched shed conditions.
OCmd_Unlock		Mode.OCmd_UnlockRel		
OCmd_Reset				
OCmd_ResetAckAll				

Solenoid-operated Valve Output Structure

Output parameters include the following:

- Output data elements (Out_) are the primary outputs of the instruction, typically used by hardware output modules; however, other application logic can use these outputs.
- Value data elements (Val_) are numeric outputs of the instruction for use by the HMI. Other application logic or software packages can use these values.
- Source and Quality data elements (SrcQ_) are outputs of the instruction that are used by the HMI to indicate PV source and quality.
- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Other application logic can use these status bits.
- Error data elements (Err_) are outputs of the instruction that indicate a particular configuration error. If any Err_ bit is set then the Sts_Err configuration error summary status is set and the Invalid Configuration indicator is displayed on the HMI.
- Not Ready data elements (Nrdy_) are bit outputs of the instruction for use by the HMI for displaying the Device Not Ready indicators.
- Alarm data elements (Alm_) are outputs of the instruction that indicate a particular alarm has occurred.
- Acknowledge data elements (Ack_) are outputs of the instruction that indicate the corresponding alarm has been acknowledged.
- Ready data elements (Rdy_) are bit outputs of the instruction that are used by the HMI to enable or disable Command buttons and entry fields.

Table 4 - P_ValveSO Output Parameters

Output Parameter	Data Type	Alias For	Description
EnableOut	BOOL		Enable Output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn input state.
Out	BOOL		1 = Energize Valve Solenoid.
SrcQ_IO	SINT		I/O signal source and quality.
SrcQ			Final Valve status source and quality: GOOD 0 = I/O live and confirmed good quality 1 = I/O live and assumed good quality 2 = No feedback configured, assumed good quality TEST 8 = Device simulated 9 = Device loopback simulation 10 = Manually entered value UNCERTAIN 16 = Live input, off-specification 17 = Value substituted at device/bus 18 = Value substituted by maintenance (Has and not Use) 19 = Shed, using last good value 20 = Shed, using replacement value BAD 32 = Signal failure (out-of-range, NaN, invalid combination) 33 = I/O channel fault 34 = I/O module fault 35 = Bad I/O configuration (for example, scaling parameters)

Table 4 - P_ValveSO Output Parameters

Output Parameter	Data Type	Alias For	Description
Val_Cmd	SINT		This parameter shows the command being processed, returns to zero once the command succeeds or fails. These values are also used for Inp_OvrdCmd: 0 = None 1 = Close 2 = Open
Val_Fdbk	SINT		This parameter shows the interpreted feedback input from the device: 0 = Moving 1 = Closed 2 = Opened 3 = Limit Switch Failure
Val_Sts	SINT		This parameter is the Primary Status, used to show the operator the 'confirmed' device status: 0 = Unknown 1 = Closed 2 = Opened 5 = Closing 6 = Opening 33 = Disabled
Val_Fault	SINT		This parameter is the Device Fault Status, used to show the operator the most severe device fault: 0 = None 16 = Transit Stall 17 = Full Stall 32 = I/O Fault 34 = Configuration Error
Val_Mode	SINT	Mode.Val	This parameter shows the current device mode: 0 = No mode 1 = Hand 2 = Maintenance 3 = Override 4 = Program (locked) 5 = Operator (locked) 6 = Program (unlocked, Operator is default) 7 = Operator (unlocked, Program is default) 8 = Program (unlocked, Program is default) 9 = Operator (unlocked, Operator is default)
Val_Owner	DINT		Current Object Owner ID (0 = not owned).
Val_Notify	SINT		Current alarm level and acknowledgement (enumeration): 0 = No alarm 1 = Alarm cleared: a reset or acknowledge is required 2 = Low (acknowledged) 3 = Low (unacknowledged) 4 = Medium (acknowledged) 5 = Medium (unacknowledged) 6 = High (acknowledged) 7 = High (unacknowledged) 8 = Urgent (acknowledged) 9 = Urgent (unacknowledged)
Sts_Closed	BOOL		1 = Valve requested to close and is confirmed closed.
Sts_Opening	BOOL		1 = Valve requested to open and waiting for open feedback.
Sts_Opened	BOOL		1 = Valve requested to open and is confirmed opened.
Sts_Closing	BOOL		1 = Valve requested to close and waiting for closed feedback.
Sts_Available	BOOL		1 = Valve available for control by automation (Program mode and ready to operate).
Sts_Bypass	BOOL		1 = Interlocks and permissives that can be bypassed are bypassed.
Sts_BypActive	BOOL		1 = Bypassing Active (Bypassed or Maintenance).

Table 4 - P_ValveSO Output Parameters

Output Parameter	Data Type	Alias For	Description
Sts_Disabled	BOOL		1 = Valve is disabled and is being held de-energized.
Sts_LSFail	BOOL		1 = Limit Switch Overlap failure.
Sts_NotRdy	BOOL		1 = Valve is Not Ready to Energize (independent of mode).
Nrdy_Disabled	BOOL		1 = Device Not Ready: • Device disabled by Maintenance • Configuration Error • Interlock not OK • Permissive not OK • Device Failure (shed requires reset) • I/O Fault (shed requires reset) • Device logic disabled/no mode
Nrdy_CfgErr			
Nrdy_Intlk			
Nrdy_Perm			
Nrdy_Fail			
Nrdy_IOFault			
Nrdy_NoMode			
Sts_MaintByp	BOOL		1 = A Maintenance bypass is active, display icon.
Sts_AlmInh	BOOL		1 = An Alarm is shelved, disabled, or suppressed, display icon.
Sts_Err	BOOL		1 = Error in Configuration: See detail bits for reason.
Err_Timer	BOOL		1 = Error in Configuration: Invalid Check Time (use 0…2,147,483).
Err_Sim	BOOL		1 = Error in Configuration: Invalid Simulation Time (use 0…2,147,483).
Err_Alarm	BOOL		1 = Error in Configuration: Invalid Alarm Delay or Severity.
Sts_Hand	BOOL	Mode.Sts_Hand	1 = Mode is: • Hand (supersedes Maintenance, Override, Program, Operator) • Maintenance (supersedes Override, Program, Operator) • Override (supersedes Program, Operator) • Program (auto) • Operator (manual)
Sts_Maint		Mode.Sts_Maint	
Sts_Ovrd		Mode.Sts_Ovrd	
Sts_Prog		Mode.Sts_Prog	
Sts_Oper		Mode.Sts_Oper	
Sts_ProgOperLock	BOOL	Mode.Sts_ProgOperLock	1 = Program or operator has requested mode lock.
Sts_NoMode	BOOL	Mode.Sts_NoMode	1 = No mode (disabled because EnableIn is false).
Sts_FullStall	BOOL	FullStall.Inp	1 = Valve Full Stall (failed to move at all).
Sts_TransitStall		TransitStall.Inp	1 = Valve Transit Stall (did not reach target position).
Sts_IntlkTrip		IntlkTrip.Inp	1 = Valve de-energized by an Interlock Not OK.
Sts_IOFault		IOFault.Inp	I/O communication fault status: 0 = OK 1 = Bad
Alm_FullStall	BOOL	FullStall.Alm	1 = Valve Full Stall (failed to move at all) alarm.
Alm_TransitStall		TransitStall.Alm	1 = Valve Transit Stall (did not reach target position) alarm.
Alm_IntlkTrip		IntlkTrip.Alm	1 = Alarm: Valve de-energized by an Interlock Not OK.
Alm_IOFault		IOFault.Alm	1 = I/O Fault alarm.
Ack_FullStall	BOOL	FullStall.Ack	1 = Full Stall, Transit Stall, Interlock Trip, or I/O Fault alarm has been acknowledged.
Ack_TransitStall		TransitStall.Ack	
Ack_IntlkTrip		IntlkTrip.Ack	
Ack_IOFault		IOFault.Ack	

Table 4 - P_ValveSO Output Parameters

Output Parameter	Data Type	Alias For	Description
Sts_FullStallDisabled	BOOL	FullStall.Disabled	1 = Full Stall, Transit Stall, Interlock Trip, or I/O Fault alarm has been disabled by Maintenance.
Sts_TransitStallDisabled		TransitStall.Disabled	
Sts_IntlkTripDisabled		IntlkTrip.Disabled	
Sts_IOFaultDisabled		IOFault.Disabled	
Sts_FullStallShelved	BOOL	FullStall.Shelved	1 = Full Stall, Transit Stall, Interlock Trip, or I/O Fault alarm has been shelved by Operator.
Sts_TransitStallShelved		TransitStall.Shelved	
Sts_IntlkTripShelved		IntlkTrip.Shelved	
Sts_IOFaultShelved		IOFault.Shelved	
Sts_FullStallSuppressed	BOOL	FullStall.Suppressed	1 = Full Stall, Transit Stall, Interlock Trip, or I/O Fault alarm has been suppressed by Program.
Sts_TransitStallSuppressed		TransitStall.Suppressed	
Sts_IntlkTripSuppressed		IntlkTrip.Suppressed	
Sts_IOFaultSuppressed		IOFault.Suppressed	
Rdy_Open	BOOL		1 = Ready to receive Operator command (Open, Close, Bypass, or Check) (enables HMI button).
Rdy_Close			
Rdy_Bypass			
Rdy_Check			
Rdy_Disable	BOOL		1 = Ready to receive Maintenance command (Disable or Enable) (enables HMI button).
Rdy_Enable			
Rdy_Reset	BOOL		1 = Ready for Operator command (Reset or ResetAckAll) (enables HMI button).
Rdy_ResetAckAll			
P_ValveSO	BOOL		Unique Parameters Name for auto-discovery.

Solenoid-operated Valve Local Configuration Tags

Configuration parameters that are array, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in RSLogix 5000 software. Open the instruction logic of the Add-On Instruction instance and then open the Data Monitor on a local tag to accomplish this configuration. These parameters cannot be modified by using controller logic or RSLogix 5000 software export/import functionality.

Table 5 - P_ValveSO Input Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_Desc	STRING_40	'Solenoid Operated Valve'	Description for display on HMI. This string is shown in the title bar of the faceplate.
Cfg_Label	STRING_20	'Valve Control'	Label for graphic symbol that is displayed on HMI. This string appears on the graphic symbol.
Cfg_Tag	STRING_20	'P_ValveSO'	Tagname for display on HMI. This string is shown in the title bar of the faceplate.

Operations

This section describes the primary operations for Add-On Instructions.

Modes

The P_ValveSO Add-On Instruction uses the following standard modes, which are implemented by using an embedded P_Mode Add-On Instruction.

Mode	Description
Operator	Control of the device is owned by the Operator. Operator Commands (OCmd_) and Operator Settings (OSet_) from the HMI are accepted.
Program	Control of the device is owned by Program logic. Program Commands (PCmd_) and Program Settings (PSet_) are accepted.
Override	Control of the device is owned by priority logic and supersedes Operator and Program control. Override commands (Inp_OvrdCmd) are accepted. If so configured, bypassable interlocks and permissives are bypassed.
Maintenance	Control of the device is owned by Maintenance. Operator Commands and Settings from the HMI are accepted. Interlocks and permissives that can be bypassed are bypassed, and device timeout checks are not processed.
Hand	Control of the device is owned by hardwired logic or other logic outside the instruction. The instruction tracks the state of the device for bumpless transfer back to one of the other modes.
No mode	The device is disabled and has no owner because the EnableIn input is false. The main instruction Logic routine is not being scanned. See Execution on page 23 for more information on EnableInFalse processing.

See the Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005, for more information.

Alarms

The following Alarms, which are implemented by using the P_Alarm Add-On Instruction, are used by the Solenoid Valve Add-On Instruction.

Alarm	Alarm Name	Description
Full Stall	FullStall	The alarm is raised if one of the following occurs: • Valve has and is using Open and/or Closed feedback • An attempt is made to open or close the valve • Valve position feedback indicates the valve did not move off its previous position at all during the configured time.
Transit Stall	TransitStall	The alarm is raised if one of the following occurs: • Valve has and is using Open and Closed feedback • An attempt is made to open or close the valve • Valve position feedback indicates the valve moved from its original position but did not reach its target position within the configured time.
I/O Fault	IOFault	Raised if the Inp_IOFault input is true.
Interlock Trip	IntlkTrip	Raised if the Solenoid Valve is energized and an Interlock causes it to de-energize. If Interlocks are not bypassed, an interlock (that cannot be bypassed) not OK or an Interlock (that can be bypassed) not OK de-energizes the Solenoid Valve. If Interlocks are bypassed, only an interlock (that cannot be bypassed) not OK de-energizes the Solenoid Valve.

The Full Stall and Transit Stall Alarms have a configurable delay to allow the open and/or closed feedback time to align with the commanded output. This delay also provides time for the Motor-operated Valve to actually open or close.

See the Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

Simulation

Simulation in P_ValveSO de-energizes the outputs and provides feedback of a working valve. You can manipulate the instruction as if a working solenoid valve were present.

Set the Inp_Sim parameter in the controller to '1' to enable simulation. The Loopback Test icon is displayed at the bottom left of the Operator faceplate, indicating the device is in simulation.

The delay between a command to Open or Close and the simulated opened or closed response is configurable (Cfg_SimFdbkT). (This same delay is used if the Solenoid Valve is configured with no Open/Close feedback.)

When you have finished in simulation, set the Inp_Sim parameter in the controller to ‘0’ to return to normal operation.

Execution

The following table explains the handling of instruction execution conditions.

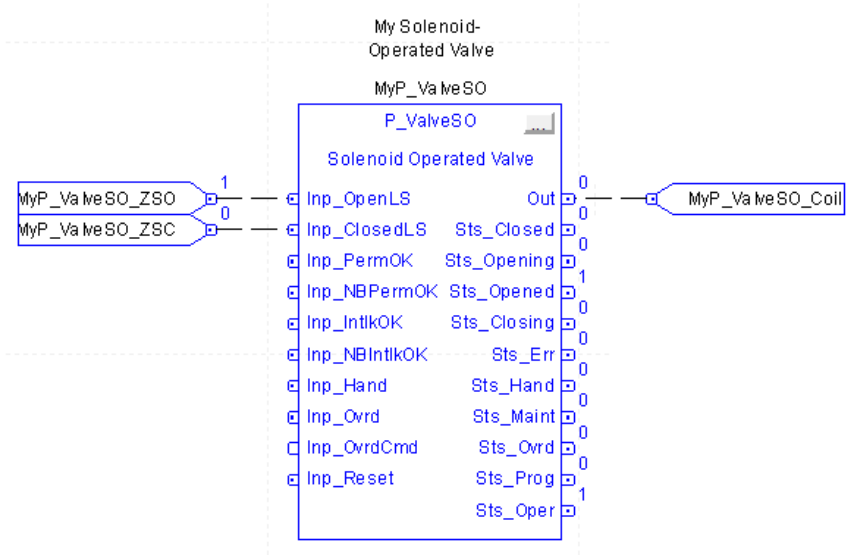
Condition	Description
EnableIn False (false rung)	Processing for EnableIn False (False Rung) is handled the same as if the Solenoid Valve were Disabled by Command. The Solenoid Valve output is de-energized and the Solenoid Valve is shown as Disabled on the HMI.
Powerup (prescan, first scan)	Processing of Modes and Alarms on Prescan and Powerup is handled by the embedded P_Mode and P_Alarm Add-On Instructions - refer to their manuals for details. On Powerup, the Solenoid Valve is treated as if it had been commanded to its de-energized position.
Postscan (SFC transition)	No SFC Postscan logic is provided.

See the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information.

Programming Example

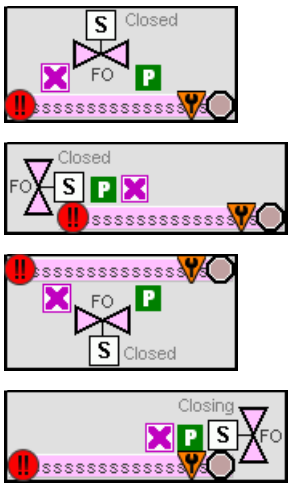
The following is a simple example of P_ValveSO.

Boolean parameters MyP_ValveSO_ZSO and MyP_ValveSO_ZSC are used as limit switch feedback inputs and MyP_ValveSO_Coil is used as an output to energize the solenoid.



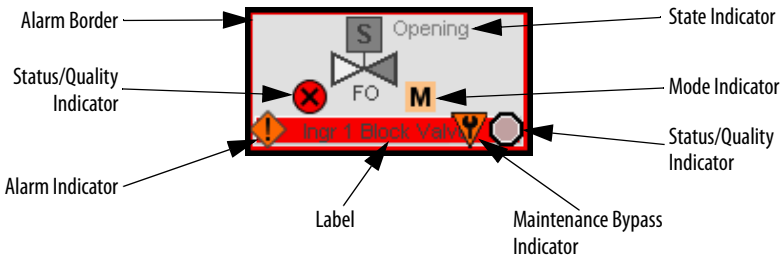
Display Elements

A display element (global object) is created once and can be referenced multiple times on multiple displays in an application. When changes are made to the original (base) object, the instantiated copies (reference objects) are automatically updated. Use of global objects, in conjunction with tag structures in the ControlLogix system, aid consistency and save engineering time.

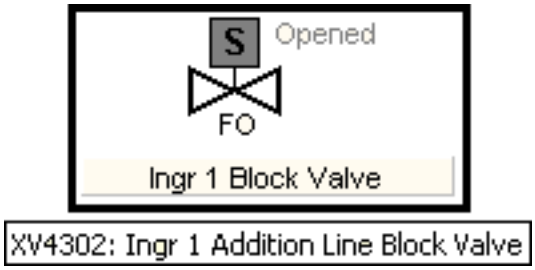
Display Element Name	Display Element	Description
P_ValveS0 P_ValveS02 P_ValveS01 P_ValveS03		Standard solenoid-operated valve global objects.

Common attributes of the Solenoid Valve Graphic Symbols include the following:

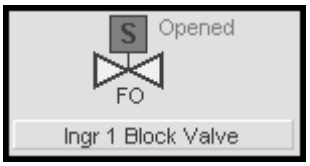
- Graphical representation of the valve
- Current state of the valve in text
- Status / quality indicator
- Mode indicator
- Label
- Alarm indicator that changes color for the severity of the alarm
- Alarm border that changes color and blinks on unacknowledged alarm
- Maintenance bypass indicator



Each Graphic Symbol includes a touch field over it that opens the object's faceplate. In addition, there is a tooltip on the graphic symbol that displays the object's configured Tag and Description.



State Indicators



The state indicator text changes and the graphic symbol color changes depending on the state of the valve.

Table 6 - Valve State Colors

Color	State Text
Half dark gray and half white	Transition: Closing or Opening
Dark Gray	Closed
White	Opened

The Valve Actuator symbol also changes color depending on the state of the valve.

Table 7 - Valve Actuator Colors

Color	State Text
Dark Gray	De-energized (Closed if Fail Closed, Opened if Fail Open)
White	Energized (Opened if Fail Closed, Closed if Fail Open)

Status/Quality Indicators

One or more of these symbols appears on the graphic symbol when the described condition is true.

Graphic Symbol	Description
	Invalid Configuration.
	I/O Fault (status is 'stale').
	I/O uncertain.
	The device is not ready to operate.
	Device disabled.
No symbol displayed	I/O quality good and Configuration valid.

TIP When the Invalid Configuration Indicator appears, you can find what configuration setting is invalid by following the indicators. Click the Graphic Symbol to open the Faceplate. The Invalid Configuration indicator appears next to the appropriate tab at the top of the Faceplate to help you find the configuration error. Once you navigate to the tab, the misconfigured item is flagged with this indicator or appears in a magenta box.

For the Solenoid-operated Valve instruction, the Invalid Configuration indicator appears under the following conditions:

- The Full Stall check time (time with no motion) or Transit Stall check time (time to reach final position) is set to a value less than zero or greater than 2,147,483 seconds.
- The feedback Simulation time is set to a value less than zero or greater than 2,147,483 seconds.
- Alarm Severity is set to a value less than 1 or greater than 1000.

TIP When the Not Ready indicator appears, you can find what condition is preventing operation by following the indicators. Click the graphic symbol to open the faceplate. The Not Ready indicator appears next to the appropriate tab at the top of the faceplate to help you find the condition. When you navigate to the tab, the condition preventing operation is flagged.

For the Solenoid-operated Valve instruction, the Device Not Ready indicator appears under the following conditions:

- Device has been disabled by Maintenance.
- There is a configuration error.
- Interlock or Permissive is not OK.
- Device failure and shed requires reset.

- I/O Fault and shed requires reset.
- Device logic is disabled or there is no mode.

Maintenance Bypass Indicator

This symbol appears to the right of the label to indicate that a Maintenance bypass has been activated.

Graphic Symbol	Description
	A Maintenance bypass is active.
No symbol displayed	No Maintenance bypass active.

TIP When the Maintenance Bypass Indicator appears, you can find what condition was bypassed by following the indicators like a 'trail of breadcrumbs'. Click the Graphic Symbol to open the Faceplate. The Maintenance Bypass Indicator appears next to the appropriate tab at the top of the Faceplate to help you find the bypass. Once you navigate to the tab, the bypassed item is flagged with this indicator.

For the Solenoid-operated Valve instruction, the Maintenance Bypass indicator appears under the following conditions:

- Interlocks and Permissives (those that can be bypassed and those that cannot be bypassed) have been bypassed.
- The valve is configured to have an Open Limit Switch (on the Engineering tab of the Faceplate), but the Open Limit Switch is not being used (selection on the Maintenance tab of the Faceplate).
- The valve is configured to have a Closed Limit Switch, but the Closed Limit Switch is not being used.

Mode Indicators

One of these symbols appears to the right of the graphic symbol to indicate the Mode of the Solenoid Valve instruction.

Graphic Symbol	Description
Transparent	Operator mode (if the default mode is Operator and in Operator mode, the mode indicator is transparent)
	Operator mode (if the default mode is Program)
	Operator mode locked
Transparent	Program mode (if the default mode is Program and in Program mode, the mode indicator is transparent)
	Program mode (if the default mode is Operator)
	Program mode locked
	Override mode
	Maintenance mode
	Hand mode
	No mode

See to the Rockwell Automation Library of Process Objects: Common Mode Block (P_Mode) Reference Manual, publication SYSLIB-RM005, for more information.

Alarm Indicators

One of these symbols appears to the left of the label to indicate the described alarm condition. The alarm border and label background blink if acknowledgement of an alarm condition is required.

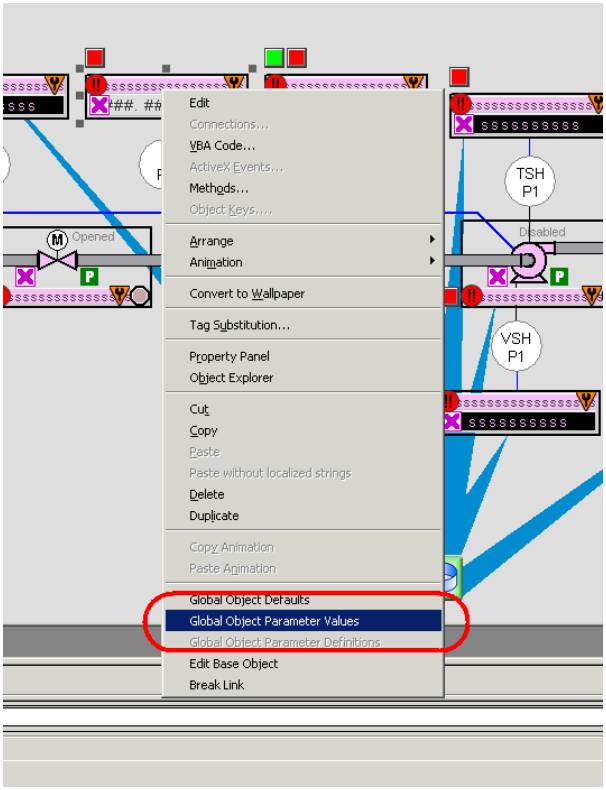
Symbol	Border and Label Background	Description
	No change in color	Alarm Inhibit: an alarm is suppressed by the Program, disabled by Maintenance, or shelved by the Operator.
	White	Return to normal (no alarm condition), but a previous alarm has not been acknowledged.
	Blue	Low severity alarm.
	Yellow	Medium severity alarm.
	Red	High severity alarm.
	Magenta	Urgent severity alarm.
No symbol	No change in color	No alarm or alarm inhibit condition, and all alarms are acknowledged.

See the Rockwell Automation Library of Process Objects: Common Alarm Block (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

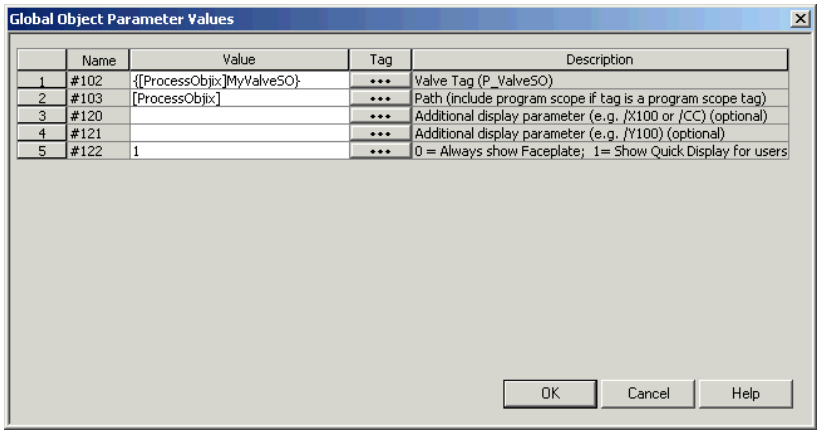
Using Display Elements

The graphic symbol for P_ValveSO can be found in the global object file (RA-BAS) Process Graphics Library.ggfx.

1. Copy the global object from the global object file and paste it in the display file.
2. In the display, right-click the global object and choose Global Object Parameter Values.



The Global Object Parameter Values dialog box appears.



The global object parameters are as follows.

Parameter	Required	Description
#102	Y	Object tag to point to the name of the associated object Add-On Instruction in the controller.
#103	Y	Path that is used for display navigation features to other objects. Include program scope if tag is a program scope tag.
#120	N	Additional parameter to pass to the display command to open the faceplate. Typically used to define position for the faceplate.
#121	N	Additional parameter to pass to the display command to open the faceplate. When you define the X and Y coordinate, separate parameters so that #120 defines X and #121 defines Y. This definition lets the same parameters be used in subsequent display commands that originate from the faceplate.
#122	Y	The options for the global object display are as follows: 0 = Always show faceplate 1 = Show Quick Display for users without Maintenance access (Code C) 2 = Always show Quick Display

3. Type the tag or value in the Value column as specified in the Description column.

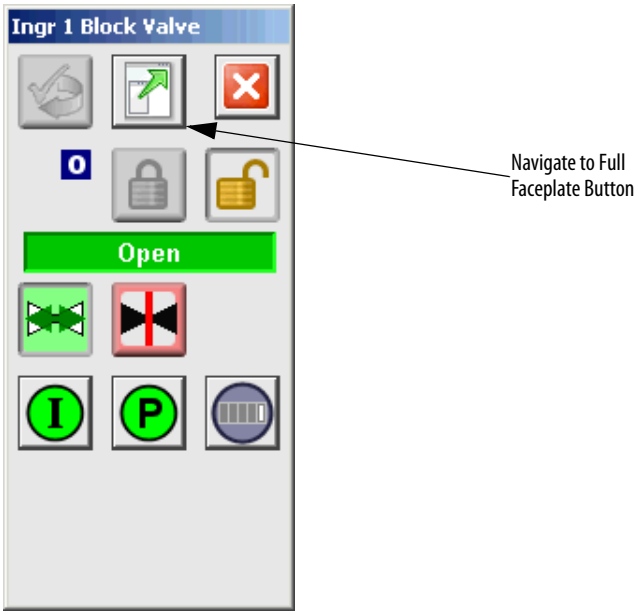
   TIP Click the ellipsis (…) to browse and choose a tag.

   Values for items marked '(optional)' can be left blank.

4. Click OK.

Quick Display

The Quick Display screen provides the means for operators to perform simple interactions with the P_ValveSO instruction instance. From the Quick Display, you can navigate to the faceplate for full access for operation, maintenance, and configuration.

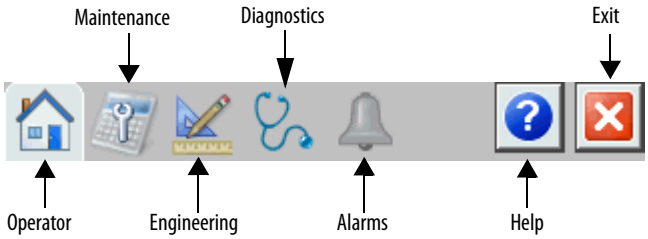


Faceplate

The P_ValveSO faceplate consists of five tabs and each tab consists of one or more pages.

The title bar of each faceplate contains the value of local configuration tags Cfg_Tag and Cfg_Desc.

The Operator tab is displayed when the faceplate is initially opened. Choose the appropriate icon at the top of the faceplate to access a specific tab.



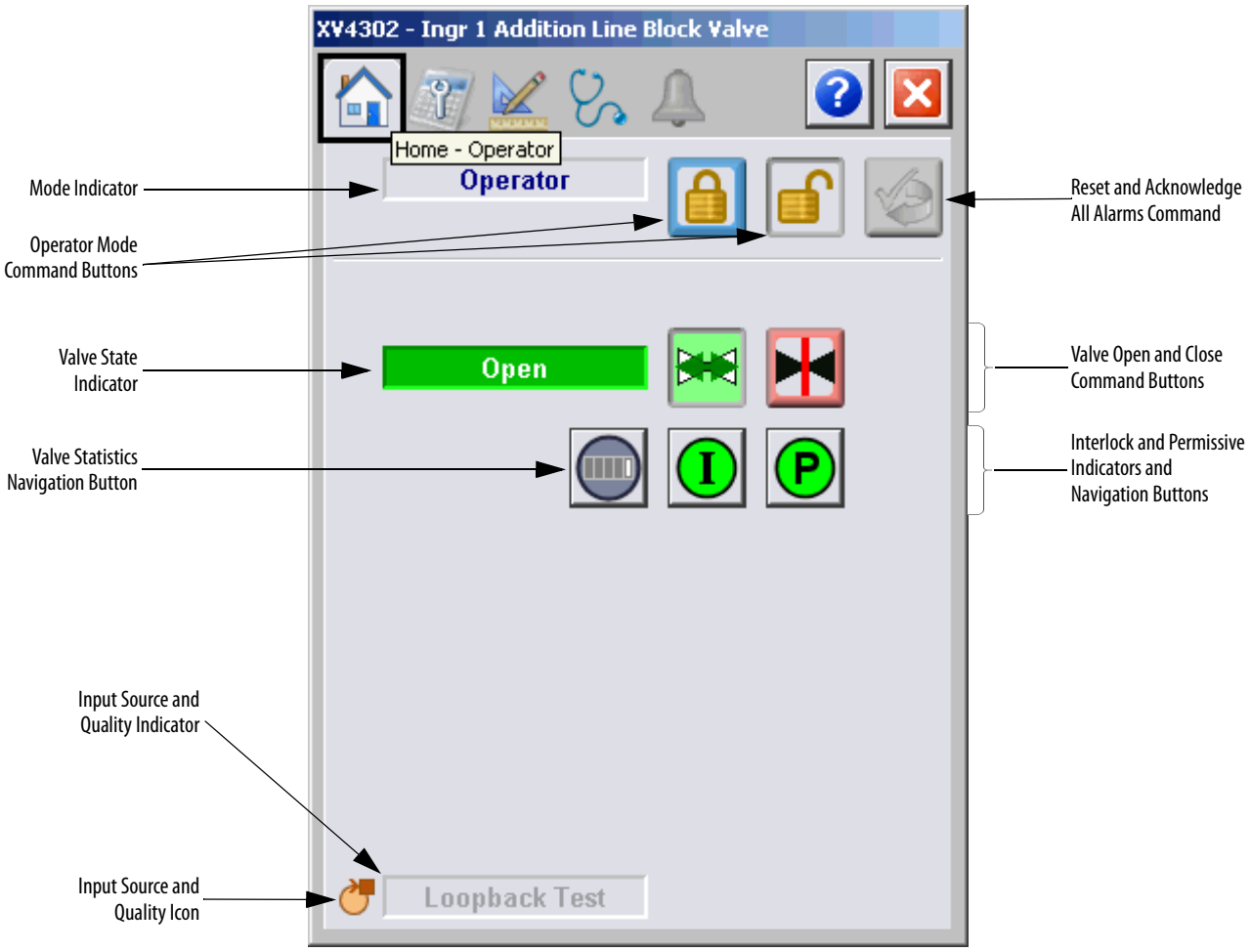
The faceplate provides the means for operators, maintenance workers, engineers, and others to interact with the P_ValveMO instruction instance. You can also view its status and values and manipulate it through its commands and settings. When a given input is restricted via FactoryTalk View security, the required user security code letter is shown in the tables that follow.

Operator Tab

The Faceplate initially opens to the Operator ('Home') tab. From here, an operator can monitor the device status and manually operate the device when it is in Operator mode.

The Operator tab has buttons to open and close the valve when it is in the proper mode and shows the following information:

- Current mode (Operator, Program, Override, Maintenance, or Hand)
- Requested modes Indicator (appears if the Operator or Program mode has been superseded by another mode). Refer to the Maintenance Tab on page 37 for more information
- Solenoid Valve State (Closing, Closed, Opening, Opened, Disabled, or I/O Fault)
- Limit Switch Fault (appears over the Valve State when the fault is active)
- Interlock and Permissive States
- Input Source and Quality indicator (See 'SrcQ' in the Output parameters table on page 16 for details)


XV4302 - Ingr 1 Addition Line Block Valve
Home - Operator
Operator
Open
Loopback Test
Mode Indicator
Operator Mode Command Buttons
Valve State Indicator
Valve Statistics Navigation Button
Input Source and Quality Indicator
Input Source and Quality Icon
Reset and Acknowledge All Alarms Command
Valve Open and Close Command Buttons
Interlock and Permissive Indicators and Navigation Buttons

The following table lists the functions on the Operator tab.

Table 8 - Operator Tab Descriptions

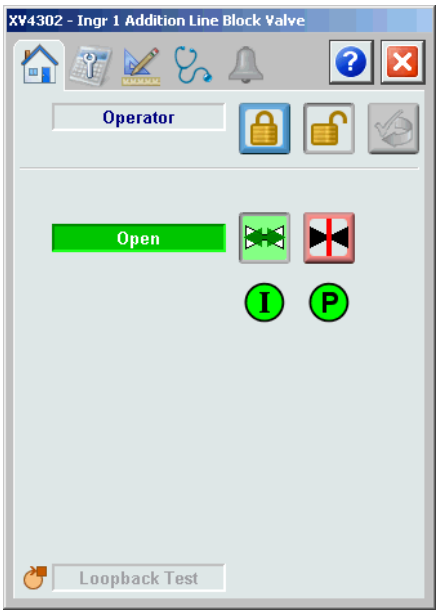
Button	Action	Security
	Click to release Operator Mode Lock.	Manual Device Operation (Code B)
	Click to acquire from Program and lock in Operator Mode.	
	Click to request Program mode.	
	Click to request Operator mode.	
	Click to reset and acknowledge all alarms.	Acknowledge Alarms (Code F)
	Click to open solenoid valve.	Normal Operation of Devices (Code A) Available in Operator or Maintenance Mode.
	Click to close solenoid valve.	
	Click to open Interlocks faceplate.	N/A
	Click to open Permissives faceplate.	
	Click to open Valve Statistics faceplate. .	

If the object is configured to have a permissive object (for example, Cfg_HasOpenPermObj or Cfg_HasClosePermObj is true), the permissive indication becomes a button. This button opens the faceplate of the source object used as a permissive (often this is a P_Perm permissive object). If the object is not configured in this way, the permissive and interlock are indicators only.

The Operator tab also has a button to open the Valve Statistics faceplate if the valve is configured to use the P_ValveStats object (Cfg_HasValveStats = 1). When the object is not configured to have an P_ValveStats instruction, the Valve Statistics button is not displayed.

See these publications for more information:

- Rockwell Automation Library of Process Objects: Interlock with First Out and Bypass (P_Intlk) Reference Manual, publication SYSLIB-RM004
- Rockwell Automation Library of Process Objects: Permissives with Bypass (P_Perm) Reference Manual, publication SYSLIB-RM007
- Rockwell Automation Library of Process Objects: 2-state Valve Statistics (P_ValveStats) Reference Manual, publication SYSLIB-RM036



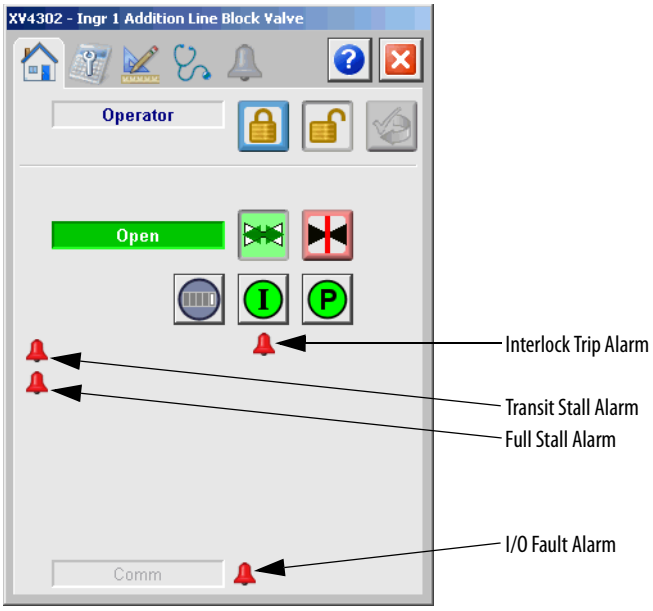
When the P_ValveSO instruction does not have associated Permissive (P_Perm) or Interlock (P_Intlk) instructions, the Permissives and Interlock buttons revert to indicators.

When the P_ValveSO instruction does not have an associated Valve Statistics (P_ValveStats) instruction, the Valve Statistics button is not shown.

One of these symbols appears to indicate the described permissives or interlock condition.

Graphic Symbol		Description
		One or more conditions not OK
		Non-bypassed conditions OK
		All conditions OK, bypass active
		All conditions OK

Alarm indicators appear on the Operator tab when the corresponding alarm occurs.



One of these symbols appears to indicate the described alarm condition. The alarm bell symbol blinks if acknowledgement of an alarm condition is required.

Table 9 - Alarm Status Symbols

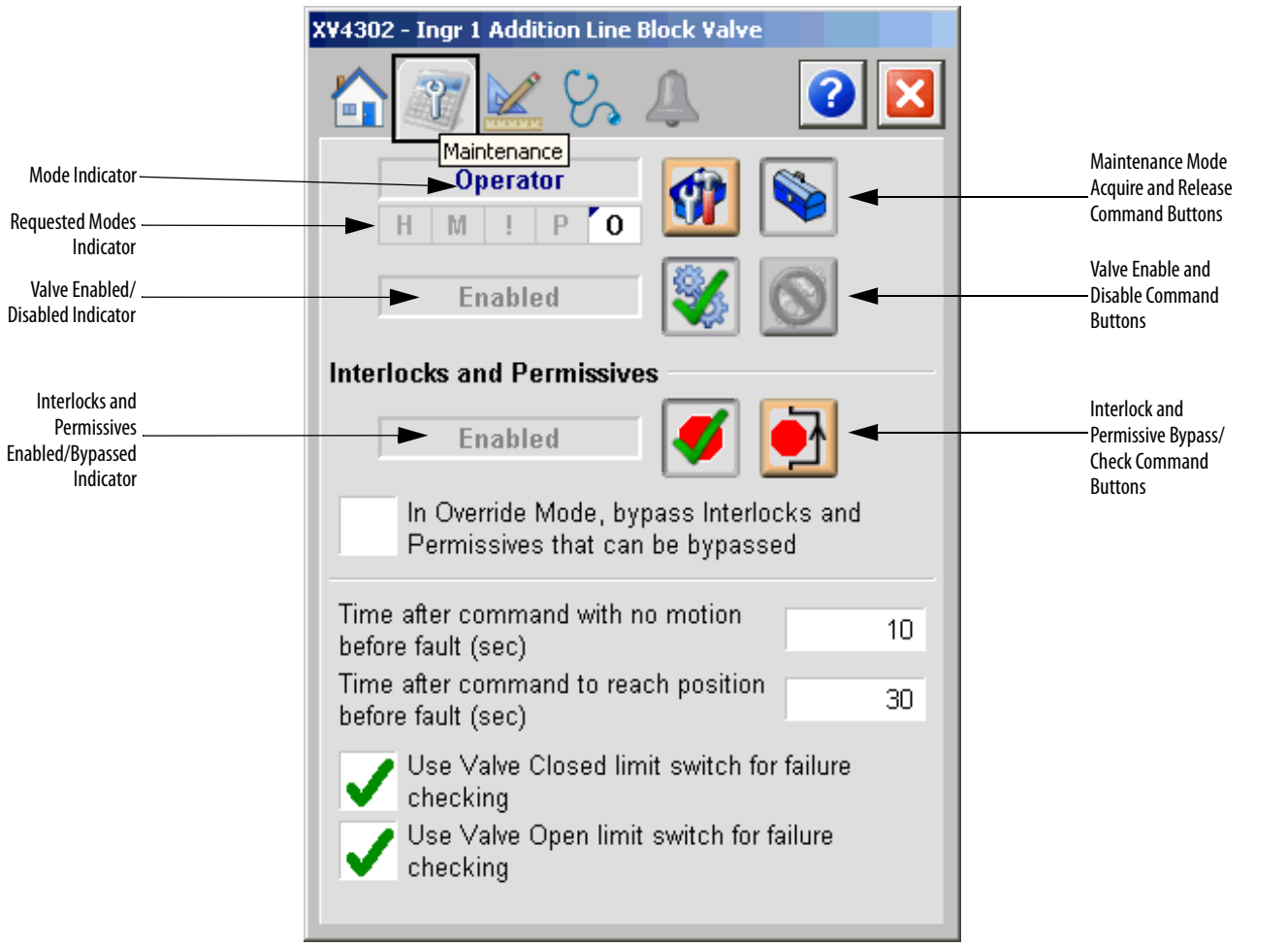
Graphic Symbol	Alarm Status
	In Alarm (Active Alarm)
	In Alarm and Acknowledged
	Out of Alarm but Not Acknowledged
	Alarm Suppressed (by Operator) (Alarm is logged but not displayed)
	Alarm Disabled (by Maintenance)
	Alarm shelved (disabled by Program Logic)

Maintenance Tab

Maintenance personnel use the information and controls on the Maintenance tab to make adjustments to device parameters. They also troubleshoot and temporarily work around device problems, and disable the device for routine maintenance.

The Maintenance tab shows the following information:

- Current mode (Operator, Program, Override, Maintenance, or Hand).
- Requested Modes indicator - This display highlights all modes that have been requested. The leftmost highlighted mode is the active mode. The mode that is flagged with a triangle in the corner is the default mode.
- Whether the solenoid valve is enabled or disabled.
- Interlock and Permissive Bypassed/Enabled indicator.
- Whether Override mode bypasses the interlocks and permissives that can be bypassed.
- Whether the valve's Limit Switch Feedback is checked when opening or closing the valve.


XV4302 - Ingr 1 Addition Line Block Valve
Maintenance
Operator
H M ! P 0
Enabled
Interlocks and Permissives
Enabled
In Override Mode, bypass Interlocks and Permissives that can be bypassed
Time after command with no motion before fault (sec)
10
Time after command to reach position before fault (sec)
30
Use Valve Closed limit switch for failure checking
Use Valve Open limit switch for failure checking
Mode Indicator
Requested Modes Indicator
Valve Enabled/ Disabled Indicator
Interlocks and Permissives Enabled/Bypassed Indicator
Maintenance Mode Acquire and Release Command Buttons
Valve Enable and Disable Command Buttons
Interlock and Permissive Bypass/ Check Command Buttons

The following table lists the functions on the Maintenance tab.

Table 10 - Maintenance Tab Descriptions

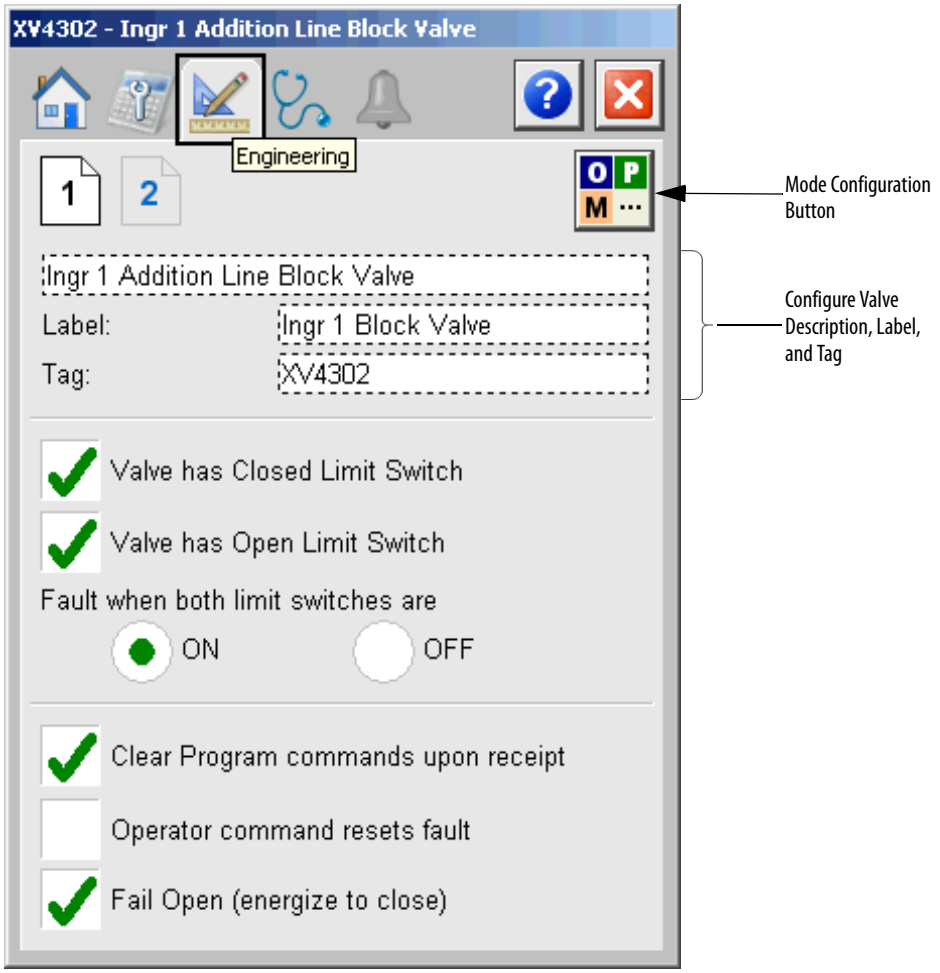
Function	Action	Security	Configuration Parameters
	Click to release valve from Maintenance mode.	Equipment Maintenance (Code C)	None
	Click to place valve in Maintenance mode.		
	Click to enable valve.		
	Click to disable valve.		
	Click to enable checking of all interlocks and permissives.	Disable Alarms Bypass Permissives and Interlocks (Code H)	
	Click to bypass checking of interlocks and permissives that can be bypassed.		
In Override mode, bypass Interlocks and Permissives that can be bypassed	Check to bypass interlocks and permissives (that can be bypassed) in Override mode.		
Time after command with no motion before fault (seconds)	Type the amount of time to allow for the valve to move off the current position's limit before raising a Full Stall alarm.	Configuration and Tuning Maintenance (Code D)	Cfg_FullStallT
Time after command to reach position before fault (seconds)	Type the amount of time to allow for completing valve travel before raising a Transit Stall alarm.		Cfg_TransitStallT
Use Valve Closed limit switch for failure checking	Check if the instruction uses the closed limit switch feedback to check for valve full stall or transit stall. **IMPORTANT:** This option is available only if 'Valve has Closed Limit Switch' on page 1 of the Engineering tab is checked. (See Engineering Tab Page 1 on page 39.)	Equipment Maintenance (Code C)	Cfg_UseClosedLS
Use Valve Open limit switch for failure checking	Check if the instruction uses the open limit switch feedback to check for valve full stall or transit stall. **IMPORTANT:** This option is available only if 'Valve has Open Limit Switch' on page 1 of the Engineering tab is checked. (See Engineering Tab Page 1 on page 39.)		Cfg_UseOpenLS

Engineering Tab

The Engineering tab provides access to device configuration parameters and ranges, options for device and I/O setup, displayed text, and faceplate-to-faceplate navigation settings, for initial system commissioning or later system changes.

The Engineering tab is divided into two pages.

Engineering Tab Page 1



The following table lists the functions on page 1 of the Engineering Page tab.

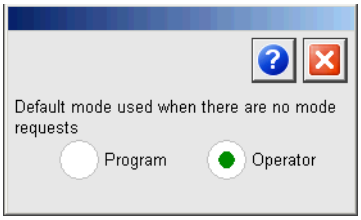
Table 11 - Engineering Tab Page 1 Descriptions

Function	Action	Security	Configuration Parameters
	Click to navigate to the Mode Configuration display.	Engineering Configuration (Code E)	None
Description	Type a Description of the valve that appears in the title bar of the faceplate.		Cfg_Desc

Table 11 - Engineering Tab Page 1 Descriptions

Function	Action	Security	Configuration Parameters
Label	Type a Label for the valve that appears on the graphic symbol.	Engineering Configuration (Code E)	Cfg_Label
Tag	Type the text to show on the title bar of each faceplate and in the tooltip.		Cfg_Tag
Valve Has Closed Limit Switch	Check if the valve has a closed limit switch and the switch is wired to Inp_ClosedLS for position monitoring.		Cfg_HasClosedLS
Valve Has Open Limit Switch	Check if the valve has an open limit switch and the switch is wired to Inp_OpenLS for position monitoring. **IMPORTANT:** If neither checkbox is checked, the valve does not have position feedback and the Full Stall alarm and the Transit Stall alarm never occur and do not exist. **IMPORTANT:** Checking either checkbox places the device in Maintenance Bypass unless the corresponding 'Use for failure checking' on page 1 of the Maintenance tab is checked. (See Maintenance Tab on page 37.)		Cfg_HasOpenLS
Fault when both limit switches are ON/OFF	Click ON if both limit switches are OFF when the valve is in motion. Click OFF if both limit switches are ON when the valve is in motion. This selection determines how the instruction detects a stuck limit switch.		Cfg_LSFail
Clear Program Commands on Receipt	Check to clear Program Commands on receipt.		Cfg_PCmdClear
Operator command resets fault	Check to allow an Operator Open or Close command to reset any previous faults (I/O Fault, Transit Stall, Full Stall, Interlock Trip), then open or close the valve. Clear this checkbox to reset faults by using the Reset command.		Cfg_OCmdResets
Fail Open (energize to close)	Check if the valve fails Open for energize-to-close operation Clear this checkbox if the valve fails Closed for energize-to-open operation.		Cfg_FailOpen

Mode Configuration Display

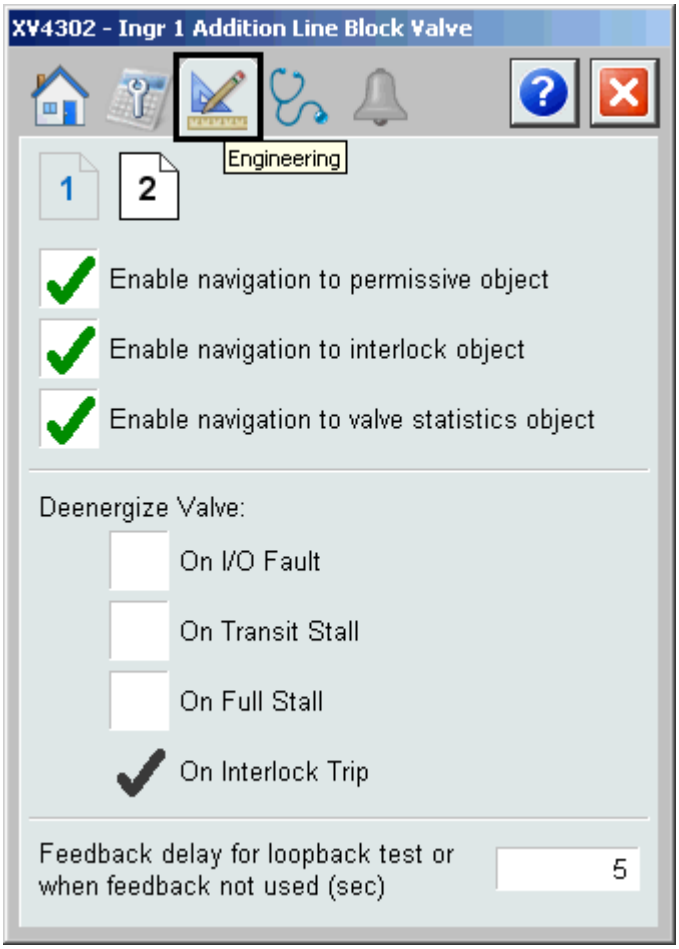


This display lets you select the default mode for the object by clicking the appropriate mode.

IMPORTANT If no mode is being requested, changing the default mode changes the mode of the instruction.

To select the default mode on this display, you must have FactoryTalk View security code E.

Engineering Tab Page 2



The following table lists the functions on page 2 of the Engineering tab.

Table 12 - Engineering Tab Page 2 Descriptions

Function	Action	Security	Configuration Parameters
Enable navigation to Permissive object	Check if a permissive object is connected to the Permissive input. This action changes the Permissive indicator to a clickable button. **IMPORTANT:** The name of the Permissive object in the controller must be this object's name with the suffix '_Perm'. For example, if your P_ValveSO object has the name 'ValveSO123', then its Permissive object must be named 'ValveSO123_Perm'.	Engineering Configuration (Code E)	Cfg_HasPermObj
Enable navigation to Interlock object	Check if an interlock object is connected to the Interlock input. This action changes the Interlock indicator to a clickable button. **IMPORTANT:** The name of the Interlock object in the controller must be this object's name with the suffix '_Intlk'. For example, if your P_ValveSO object has the name'ValveSO123', then its Interlock object must be named 'ValveSO123_Intlk'.		Cfg_HasIntlkObj
Enable navigation to Valve Statistics object	Check if a Valve Stats object is used with this valve. This action makes the Valve Statistics button visible. **IMPORTANT:** The name of the Valve Stats object in the controller must be this object's name with the suffix '_ValveStats'. For example, if your P_ValveSO object has the name'ValveSO123', then its Valve Stats object must be named 'ValveSO123_ValveStats'		Cfg_HasStatsObj
Deenergize Valve on I/O Fault	Check to de-energize the output to the valve and return it to its fail position, when an I/O Fault condition occurs. Clear this checkbox to keep the output to the valve in its current state on an I/O Fault condition. **IMPORTANT**: When this checkbox is checked and an I/O Fault condition occurs, a Reset is required before the valve can be energized.		Cfg_ShedOnIOFault
Deenergize Valve on Transit Stall	Check to de-energize the output to the valve and attempt to return it to its fail position, when a Transit Stall condition occurs. Clear this checkbox to keep the output to the valve in its current state (keep trying) on a Transit Stall condition. (A Transit Stall means the valve, when commanded to move, moved off its original position, but did not reach its commanded position before the Transit Stall time expired.) **IMPORTANT**: When this checkbox is checked and a Transit Stall condition occurs, a Reset is required before the valve can be energized.		Cfg_ShedOnTransitStall
Deenergize Valve on Full Stall	Check to de-energize the output to the valve, attempting to return it to its fail position, when a Full Stall condition occurs. Clear this checkbox to keep the output to the valve in its current state (keep trying) on a Full Stall condition. (A Full Stall means the valve, when commanded to move, did not move off its original position before the Full Stall time expired.) **IMPORTANT**: When this checkbox is checked and a Full Stall condition occurs, a Reset is required before the valve can be energized.		Cfg_ShedOnFullStall

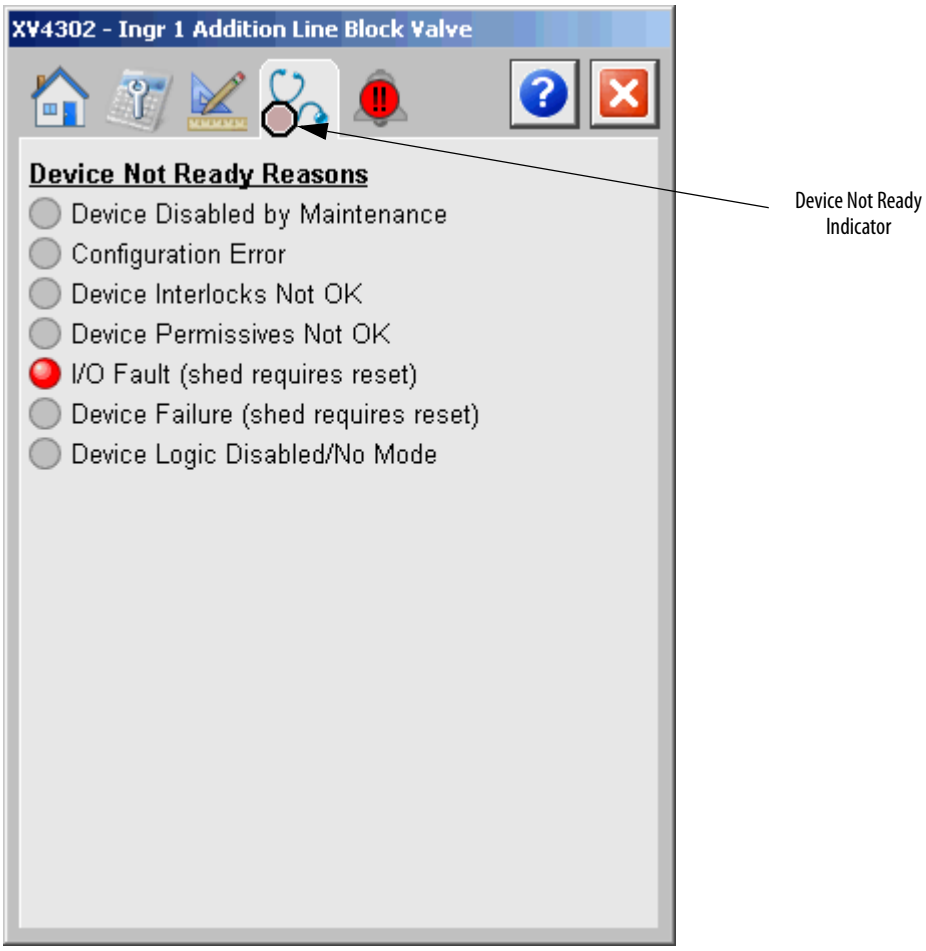
Table 12 - Engineering Tab Page 2 Descriptions

Function	Action	Security	Configuration Parameters
Deenergize Valve on Interlock Trip	The valve outputs are always de-energized on an Interlock Trip. This item cannot be unchecked. It is displayed as a reminder that the Interlock Trip function always de-energizes the valve.	Engineering Configuration (Code E)	None
Feedback delay for loopback test or when feedback is not used (seconds)	Sets the time delay (in seconds) for the opened or closed status to be echoed back when Simulation is enabled or when limit switch feedback is not used.		Cfg_SimFdbkT

Diagnostics Tab

The Diagnostic tab provides indications that are helpful in diagnosing or preventing device problems. These diagnostic indications can include specific reasons a device is 'Not Ready', device warnings and faults, warning and fault history, and predictive/preventive maintenance data.

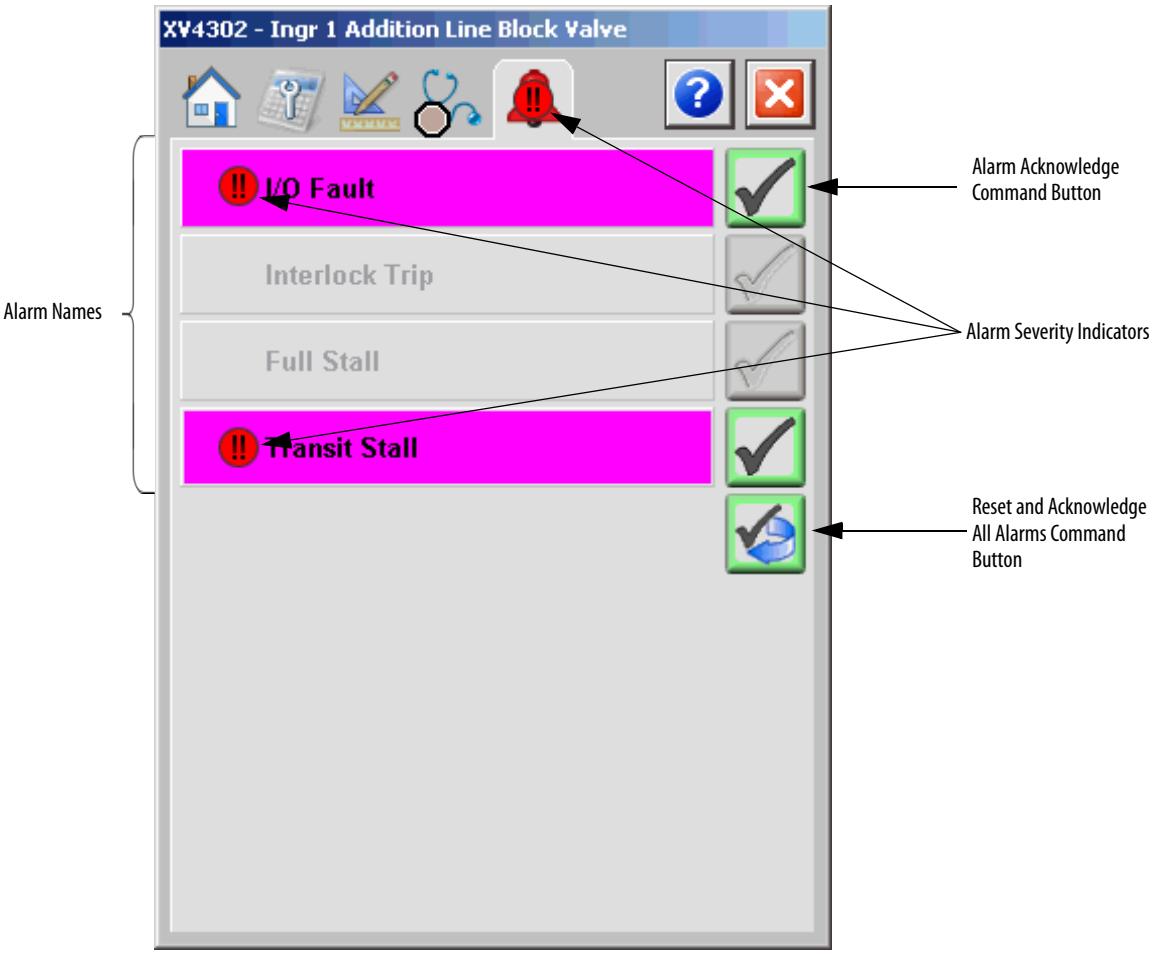
The Diagnostics tab displays possible reasons the device is not ready.


XV4302 - Ingr 1 Addition Line Block Valve
Device Not Ready Reasons
Device Disabled by Maintenance
Configuration Error
Device Interlocks Not OK
Device Permissives Not OK
I/O Fault (shed requires reset)
Device Failure (shed requires reset)
Device Logic Disabled/No Mode
Device Not Ready Indicator

The previous image indicates that there has been an I/O fault and the shed needs to be reset.

Alarms Tab

The Alarms tab displays each configured alarm for the P_ValveSO instruction. The icon on the tab for the alarms page changes color based on the current active alarms. A blinking alarm icon indicates that one or more alarms must be acknowledged or the device must be reset.



Click an alarm name to open the P_Alarm faceplate for that alarm. From the P_Alarm faceplate, you can configure and perform additional operations on the alarm.

If an alarm is active, the panel behind the alarm changes color to match the severity of the alarm. The color of the bell icon at the top of the faceplate shows the severity of the highest active alarm, and the icon blinks if any alarm is unacknowledged or requires reset.

The following table shows the colors associated with alarm severity.

Table 13 - Alarm Color Definitions

Color	Definition
Magenta	Urgent
Red	High
Yellow	Medium
Blue	Low
White (bell icon)	All alarms have cleared, but one or more alarms are unacknowledged
Background (light gray)	No alarm

The following table shows the functions on the Alarms tab.

Table 14 - Alarms Tab Descriptions

Button	Action	Security
	Click to acknowledge the alarm.	Acknowledge Alarms (Code F)
	Click to reset and acknowledge all alarms.	
Alarm Name	Click an alarm name to display the Alarm Operator faceplate.	

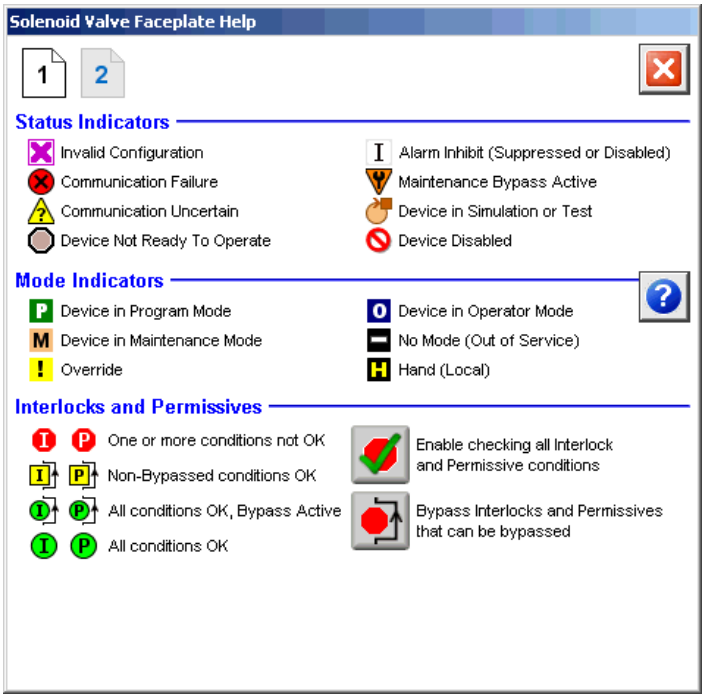
The Reset and Acknowledge All Alarms button is enabled, the panel behind the alarm blinks, and the Alarm Acknowledge button is enabled if the alarm requires acknowledgment. Click the button with the check mark to acknowledge the alarm.

See the Rockwell Automation Library of Process Objects: Common Alarm Mode (P_Alarm) Reference Manual, publication SYSLIB-RM002, for more information.

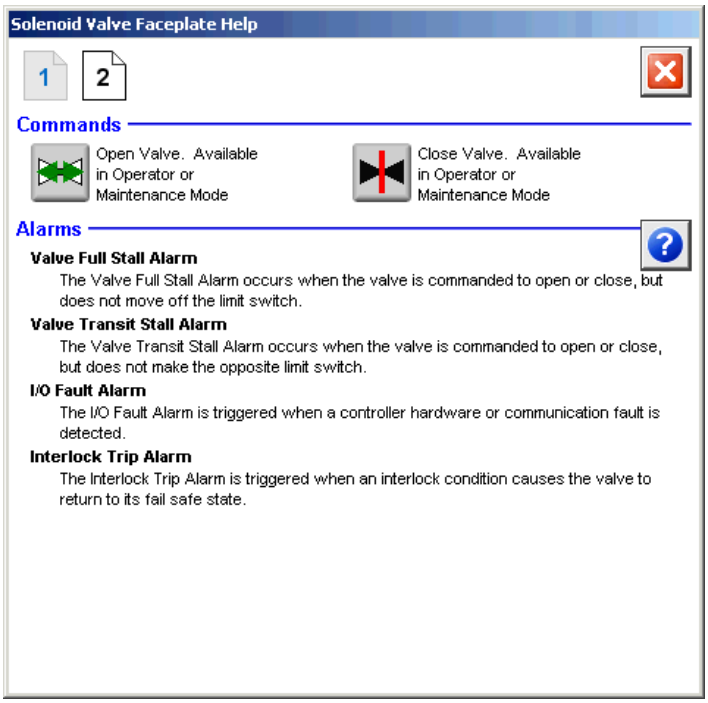
Solenoid-operated Valve Faceplate Help

The Faceplate Help is divided into two pages.

Faceplate Help Page 1



Faceplate Help Page 2


Solenoid Valve Faceplate Help
1
2
Commands
Open Valve. Available in Operator or Maintenance Mode
Close Valve. Available in Operator or Maintenance Mode
Alarms
Valve Full Stall Alarm
The Valve Full Stall Alarm occurs when the valve is commanded to open or close, but does not move off the limit switch.
Valve Transit Stall Alarm
The Valve Transit Stall Alarm occurs when the valve is commanded to open or close, but does not make the opposite limit switch.
I/O Fault Alarm
The I/O Fault Alarm is triggered when a controller hardware or communication fault is detected.
Interlock Trip Alarm
The Interlock Trip Alarm is triggered when an interlock condition causes the valve to return to its fail safe state.

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